PATENT ABSTRACTS OF JAPAN

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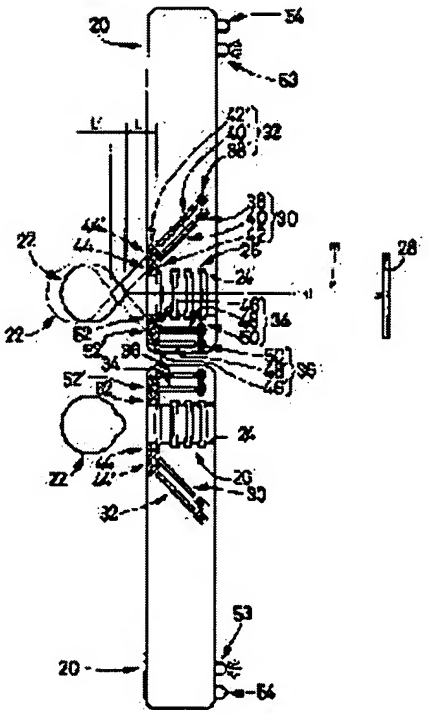
(54) OPHTHALMOSCOPE

(57)Abstract:

PURPOSE: To provide a simplified and compact ophthalmoscope capable of easily confirming the position of an eye to be inspected and preventing a measuring error due to the deviation of the eye to be inspected from occurring favorably.

CONSTITUTION: The ophthalmoscope equipped with an observation window 24 on which a lens 26 for inspection is loaded and formed so as to visualize a barometer 28 from the rear side of the observation window 24 via the lens 26 is provided with (a): a projector means 30 (32) which projects light on one point on the optical axis of the observation window 24 where the cornea apex of the eye 22 to be inspected is located, and (b): a light receiving means 34 (36) which outputs a light reception signal by receiving reflected light by the cornea apex of the eye 22 to be inspected emitted from the projector means 30 (32).



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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the consciousness type optometry equipment which can prevent or amend advantageously the measurement error by the range difference which starts the consciousness type optometry equipment used for measurement of eye refraction frequency, especially originates in location gap examined the eyes.
[0002]
[Background of the Invention] From the former, as a kind of the equipment which measures eye refraction frequency for inspection of the ametropy of an eyeball etc., it has the observation port 4 equipped with the predetermined lens 2 exchangeable, and the consciousness type optometry equipment it was made to make the optometry 6-ed check an index 12 by looking through this lens 2 from the back of this observation port 4 is known as shown in drawing 2 .
[0003] By the way, in this consciousness type optometry equipment, eye refraction frequency is measured under the prerequisite that distance (collimation distance):L between a lens rear face (criteria location) and cornea top-most vertices examined the eyes is a certain fixed value (for example, 12mm). Therefore, on the occasion of inspection, the optometry 6-ed needs to check whether it is in the location with which are satisfied of this value.
[0004] So, with conventional consciousness type optometry equipment, generally, the cornea collimation aperture 10 can be formed in the optometry unit 8, and the ** person 14 can check now the location of cornea top-most vertices examined [which checks an index 12 by looking / 6] the eyes through a reflecting mirror 16 and the collimation graduation 18 as illustrated.
[0005] However, with such conventional consciousness type optometry equipment, since the location examined [6] the eyes was not able to be checked to accuracy on the collimation graduation 18 when there is an angle error in the observation direction (the cornea collimation direction) by the ** person 14 as shown by the imaginary line all over drawing, there was a problem [accuracy of measurement / sufficient] of being difficult to get.
[0006] And with conventional consciousness type optometry equipment, after it is impossible to check the both eyes 6 and 6 of the subject simultaneously and it performed alignment examined [one / 6] the eyes, when it performed alignment examined [of another side / 6] the eyes as a matter of fact, a possibility that a gap might arise was also in the location examined [which carried out alignment previously / of the direction] the eyes.
[0007] Moreover, in order to set to such conventional consciousness type optometry equipment and to prevent change of the collimation distance of an inspection term throughout, the ** person 14 had to check the location examined [6] the eyes frequently, actuation was troublesome and the problem that a ** person's burden was large also had it.
[0008] In addition, while preventing lowering of the accuracy of measurement by the angle error of the observation direction like **** etc. by detectors', such as CCD's, detecting optically the location (collimation distance) of cornea top-most vertices examined the eyes to JP,2-52631,A, making it output to it as an electrical signal, and detecting the location examined the eyes automatically, the consciousness type optometry equipment which aimed at improvement in operability is proposed.
[0009] However, if it was in this optometry equipment, conventionally [****] which is shown in said drawing 2 , in the consciousness type optometry equipment of structure, detectors, such as CCD, have been arranged only instead of a ** person, and it was not avoided that equipments large-sized and complicated, and expensive, such as a CCD camera and a television monitor, are needed as the detector since it is what is going to take out collimation distance as an electrical signal, but utilization was very difficult.
[0010] And since optometry equipment was enlarged, on the occasion of inspection, the feeling of tension of the subject was caused and there was also a problem that it became difficult to measure exact eye refraction frequency.
[0011]
[Problem(s) to be Solved] In here, it succeeds in this invention against the background of the situation like ****, and

the place made into the solution technical problem has structure in offering easy and compact consciousness type optometry equipment while being able to check the location examined the eyes easily.
[0012]
[Means for Solution] In order to solve this technical problem, and this invention In the consciousness type optometry equipment have [equipment] the observation port equipped with a predetermined lens exchangeable, and it was made to make optometry-ed check an index by looking through this lens from the back of this observation port (a) It is characterized by establishing a floodlighting means to project light on one on the optical axis of said observation port you are made to be located at cornea top-most vertices examined [said] the eyes, and a light-receiving means to output a light-receiving signal in response to the reflected light by cornea top-most vertices examined [of the light on which it was projected with (b) this floodlighting means / said] the eyes.
[0013] Moreover, this invention is characterized [the] also by the consciousness type optometry equipment which it comes to consist of a part of floodlighting way in said floodlighting means, and/or light-receiving way [at least] in said light-receiving means with an optical fiber.
[0014] Furthermore, said floodlighting means and said light-receiving means consist of two or more floodlighting means to project light on a mutually different point on the optical axis of said observation port, and two or more light-receiving means to correspond to each [these] floodlighting means, and this invention is characterized [the] also by the consciousness type optometry equipment which it comes to prepare two or more pairs again.
[0015] It is consciousness type optometry equipment with which it comes to prepare a floodlighting means and two or more pairs of light-receiving means like. moreover, writing this invention -- Based on the light-receiving signal outputted by these two or more light-receiving means, the collimation distance between cornea top-most vertices examined [said] the eyes and the criteria location of said lens is detected, and it is characterized [the] also by the thing in which it comes to prepare an operation means to amend the measured value of eye refraction frequency according to this detection value.
[0016] Furthermore, this invention is consciousness type optometry equipment made into various kinds of structures like ****, and is characterized [the] also by the thing which comes to have the display which displays the light-receiving condition of said reflected light possible [recognition] from the exterior based on the light-receiving signal outputted with said light-receiving means.
[0017]
[Function and Effect] Namely, it sets to the consciousness type optometry equipment made into the structure of following this invention. Only when made to be located at cornea top-most vertices examined the eyes by the predetermined location defined beforehand, with the light-receiving signal outputted with this light-receiving means from the place as for which the reflected light by optometry-ed of the light on which it was projected with the floodlighting means carries out ON light to a light-receiving means The location examined the eyes can be checked easily.
[0018] And in this consciousness type optometry equipment, since the location examined the eyes is judged by the existence of the ON light to a light-receiving means, it is possible to adopt the easy light-receiving sensor as this light-receiving means, it is not necessary to use complicated things, such as a CCD camera, and, so, each of simplification of the structure of equipment, miniaturization, and low cost-ization may be attained effectively.
[0019] Moreover, since a ** person does not need to check the check of the location examined the eyes by looking directly and does not need to perform it in this consciousness type optometry equipment, while a ** person's effort may be mitigated, generating of the measurement error resulting from the fault on actuation of a ** person etc. is prevented, and it obtains, and it is stabilized and the outstanding accuracy of measurement can be obtained.
[0020] Furthermore, in the consciousness type optometry equipment according to claim 2 with which it comes to consist of a part of optical path [at least] of a floodlighting means or a light-receiving means optical fibers, it is not necessary to necessarily set up an optical path linearly, the design degree of freedom of equipment structure may be secured advantageously, and much more miniaturization of equipment, improvement in fabrication nature, etc. may be achieved by it.
[0021] Moreover, in the consciousness type optometry equipment according to claim 3 which comes to prepare a floodlighting means and two or more pairs of light-receiving means, also when it is difficult for you to make it located in the location aiming at optometry-ed for the reasons of the fixtures of the face of the subject, eye the back, etc., it is possible to position optometry-ed to high degree of accuracy, and eye refractive power can be measured advantageously.
[0022] Furthermore, it is based on the collimation distance detected with two or more pairs of floodlighting means, and a light-receiving means again. In the consciousness type optometry equipment according to claim 4 which comes to prepare an operation means to add the amendment according to the location examined the eyes to measured value

While being able to acquire right eye refractive power easily irrespective of the location examined the eyes and preventing generating of the error by the fault at the time of amendment, simplification of measurement may be attained very advantageous.

[0023] Furthermore, it sets to the consciousness type optometry equipment according to claim 5 which comes to prepare the display which displays the light-receiving condition by the light-receiving means, and measurement workability may improve much more advantageous from the place where a ** person can know easily the location gap under the location examined the eyes or inspection etc.

[0024]

[Example] Hereafter, in order to clarify this invention still more concretely, suppose that it explains to a detail about the example of this invention, referring to a drawing.

[0025] First, the configuration of the consciousness type optometry equipment as one example of this invention is roughly shown in drawing 1 . Among this drawing, 20 and 20 are the equipment cases divided into right-and-left both eyes, the distance between relativity is supported possible [change] by the supporter material which is not illustrated, and the response of them in the both eyes 22 of the subject and the distance which it is between 22 is enabled.

[0026] Moreover, the observation port 24 is formed in each [these] equipment case 20, and the checking lens 26 is arranged in this observation port 24. In addition, although designation is not carried out on the drawing, this checking lens 26 is prepared for the interior or the exterior of the equipment case 20, and two or more kinds from which refraction frequency differs can choose which lens, and can exchange them.

[0027] And the eye refractivity examined [22 and 22] the eyes is measured by arranging the equipment cases 20 and 20 at the front examined [22 and 22] the eyes, making an index 28 check by looking and getting to know the checking lens which gives the best eyesight like conventional consciousness type optometry equipment, through the checking lens 26 set to observation ports 24 and 24 by the optometry 22 and 22-ed.

[0028] Furthermore, the first floodlighting equipment 30 as a floodlighting means and the second floodlighting equipment 32, the first light-receiving equipment 34 as a light-receiving means, and the second light-receiving equipment 36 are arranged in the optical axis of an observation port 24 with which the checking lens 26 is arranged by this consciousness type optometry equipment, i.e., the both sides symmetrically located on both sides of collimation-axis:[of the index 28 by the optometry 22-ed] m, respectively. In addition, although the first floodlighting equipment 30, the second floodlighting equipment 32, and the first light-receiving equipment 34 and the second light-receiving equipment 36 approach mutually and are indicated in drawing 1 , simplification of the arrangement structure of equipment may be attained by only the specified quantity's being able to shift those each sets and arranging them in a hoop direction actually, at the circumference of optical-axis:m of an observation port 24 etc.

[0029] The this first and second floodlighting equipment 30 and 32 is constituted including the condenser lens 42 with which the light drawn in the light sources 38, such as LED, 38', the optical fiber 40 and 40' that draw this light source 38 and the light from 38', and this optical fiber 40 and 40' is penetrated, and 42', respectively. And it is projected on a condenser lens 42 and the light which penetrated 42' by the point on the optical axis of said observation port 24 through the floodlighting aperture 44 and 44' which were prepared in the equipment case 20.

[0030] Moreover, in here, it is projected on the light on which it is projected through the floodlighting aperture 44 by the first floodlighting equipment 30, and the light on which it is projected through floodlighting aperture 44' by the second floodlighting equipment 32 by mutually different point which only predetermined distance isolated on the optical axis of an observation port 24. By this example, and the light on which it is projected by the first floodlighting equipment 30 especially The point which is distant from the criteria location (tooth back of the checking lens 26) of the checking lens 26 only standard distance:L=12 mm on the optical axis of an observation port 24 While being projected by (it is hereafter called a "standard point"), it is projected on the light on which it was projected by the second floodlighting equipment 32 on the optical axis of an observation port 24 by the point which separated only predetermined distance:L' from it back further.

[0031] On the other hand, moreover, the first and second light-receiving equipment 34 and 36 The condenser lens 46 with which the reflected light by the optometry 22-ed of the light on which it was projected with the said first and second floodlighting equipment 30 and 32 is penetrated, respectively, and 46', It is constituted including the photo detectors 50, such as a photodiode with which the light drawn in this condenser lens 46, the optical fiber 48 to which the light which penetrated 46' is led, 48', and this optical fiber 48 and 48' is irradiated, and 50'.

[0032] When the optometry 22-ed is made to be located by the standard point, and the light on which it was projected with the first floodlighting equipment 30 By being reflected at cornea top-most vertices examined [22] the eyes, and carrying out incidence to the first light-receiving equipment 34 through the light-receiving aperture 52 prepared in the equipment case 20 While the electrical signal which expresses an incidence condition with a photo detector 50 is outputted, when being made only for predetermined distance:L' to be back located in the optometry 22-ed from a

standard point When it is reflected at cornea top-most vertices examined [22] the eyes and the light on which it was projected with the second floodlighting equipment 32 carries out incidence to the second light-receiving equipment 36 through light-receiving aperture 52' prepared in the equipment case, the electrical signal which expresses an incidence condition with photo detector 50' is outputted.

[0033] So, only in predetermined distance:L', the optometry 22-ed can judge whether it is located in a back point from the standard point with the electrical signal outputted in photo detector 50' which can judge whether the optometry 22-ed is located in a standard point with the electrical signal outputted by the photo detector 50 which constitutes the first light-receiving equipment 34, and constitutes the second light-receiving equipment 36.

[0034] Furthermore, if it is in the optometry equipment of this example, the first display lamp 53 and second display lamp 54 are formed in each equipment case 20. And when an incidence signal is outputted by the photo detector 50 which constitutes the first light-receiving equipment 34 While indicating that the first display lamp 53 lights up and the optometry 22-ed is located in a standard point When an incidence signal is outputted in photo detector 50' which constitutes the second light-receiving equipment 36, the second display lamp 54 lights up and the optometry 22-ed indicates that only predetermined distance:L' is back located from the standard point.

[0035] By the way, in order to measure the eye refractive power examined [22] the eyes with the consciousness type optometry equipment made into such structure, you move the equipment cases 20 and 20 and the optometry 22-ed makes it located through the checking lens 26 arranged in the observation port 24, first conventionally like equipment, so that the index 28 arranged ahead can be checked by looking.

[0036] Subsequently, the frame reliance which is not illustrated is adjusted, you perform alignment in the cross direction examined [22] the eyes to the equipment cases 20 and 20, and only predetermined distance:L' makes it the optometry 22-ed located in a back point from a standard point or a standard point. That is, the ** person can check easily that the optometry 22-ed has been made to be located by which those points by burning of the first or the second display lamp 53 and 54.

[0037] in addition, only predetermined distance:L' is located in a back point from these standard point or a standard point in the optometry 22-ed -- making -- in order to improve the operability for, it is effective to prepare the cornea collimation aperture (to refer to drawing 2) adopted from the former to the equipment cases 20 and 20 etc.

[0038] And measurement of eye refraction frequency will be performed from whenever [lens / of the checking lens 26 which gives the best eyesight] by making the optometry 22-ed check an index 28 by looking through various kinds of checking lenses 26 as usual under the burning condition of the first or the second display lamp 53 and 54.

[0039] In there, when it measures under the burning condition of the first display lamp 53 (i.e., when the optometry 22-ed is measured under the condition that you made it located in a standard point), it is not necessary to amend by it being possible to get to know eye refraction frequency promptly from whenever [lens / of the checking lens 26].

[0040] When you cannot make it the optometry 22-ed locate in a standard point from the reason of the fixtures of the face of the subject etc. but it measure under the burning condition of the second display lamp 54 on the other hand (i.e., when the optometry 22-ed be measure under the condition that only predetermined distance:L' made it locate in a back point from a standard point), it be necessary to amend to the eye refraction frequency obtained from whenever [lens / of the checking lens 26]. That is, it is DS about the eye refraction frequency obtained from whenever [lens / of the checking lens 26] so that it might be well-known. If it carries out, it is eye refraction frequency:Dg examined the eyes. It is expressed below (formula 1) by making a diopter into a unit.

[0041]

$$Dg = 1000 \times DS / (1000 - DS \times L') \quad \text{... (formula 1)}$$

[0042] In addition, such amendment processing is distance:L' and eye refraction frequency:DS. Eye refraction frequency:DS which computes the correction value according to a value beforehand, creates the table etc., and was obtained It is possible to also perform a value, when a ** person amends, and to also make an arithmetic unit perform this amendment processing automatically, although it is possible.

[0043] It is made only for predetermined distance:L' to specifically be back located in the optometry 22-ed from a standard point. Eye refraction frequency:DS obtained after measurement when measurement was performed to the bottom of the condition that the incidence signal was outputted from photo detector 50' which constitutes the second light-receiving equipment 36 The arithmetic unit which receives and performs amendment count based on the above (formula 1), Eye refraction frequency computed by this arithmetic unit: Dg It may realize by establishing the data-processing means equipped with output units, such as a printer to output.

[0044] Therefore, it sets to the consciousness type optometry equipment mentioned above. With the light-receiving signal outputted with the first and second light-receiving equipment 34 and 36 Without a ** person checking the location examined [22] the eyes by looking directly, can check the location examined [this / 22] the eyes easily, and so, while measurement actuation is easy and a ** person's burden may be mitigated Generating of the measurement

error resulting from the fault on actuation of a ** person etc. is prevented, and it obtains, and it is stabilized and the outstanding accuracy of measurement can be obtained.

[0045] And if it is in this consciousness type optometry equipment, it is possible to adopt the easy photo detector 50 as a light-receiving means and 50', and it has very easy equipment structure and compact equipment structure, and may realize from it not being necessary to use complicated things, such as a CCD camera, advantageously.

[0046] Furthermore, in the optometry equipment of this example, since a part of optical path in the floodlighting equipments 30 and 32 and the light-receiving equipments 34 and 36 consists of an optical fiber 48 and 48', it is not necessary to set up an optical path linearly, and the design degree of freedom of equipment structure may be secured advantageously.

[0047] Moreover, in the optometry equipment of this example, since floodlighting equipment and light-receiving equipment are formed two pairs, also when it is difficult for you to make it optometry-ed located in a standard point, it is possible to position optometry-ed to high degree of accuracy, and eye refraction frequency can be measured advantageously.

[0048] It sets to the optometry equipment of this example again. Furthermore, with the first and the second display lamp 53 and 54 Whether the light-receiving condition by the first and second light-receiving equipment 34 and 36 is displayed, and the optometry 22-ed is located in the predetermined location behind a standard point or this standard point from the ability to check by looking now easily A ** person can know easily the location gap under the location examined [22] the eyes or inspection etc., and the further excellent measurement workability may be demonstrated.

[0049] As mentioned above, although the example of this invention has been explained in full detail, this is literal instantiation, and this invention is limited only to this example and interpreted.

[0050] For example, although floodlighting equipment and light-receiving equipment are formed two pairs and it can detect now whether the optometry 22-ed is located in two points of the predetermined location behind a standard point and this standard point in said example, of course, it is also possible a couple or to prepare three or more pairs in the floodlighting equipment and light-receiving equipment which succeed in this pair.

[0051] Furthermore, it is also possible to adopt a buzzer etc. instead of the first and the second pilot light 53 and 54, and when it seems that an arithmetic unit is operated and amendment processing is made to perform automatically with the first and second output signals from the light-receiving equipments 34 and 36, such an external display is not necessarily required.

[0052] Moreover, although a part of optical path in floodlighting equipment and light-receiving equipment was constituted from said example by the optical fiber, it is not necessary to necessarily use an optical fiber.

[0053] In addition, although listing is not carried out one by one, unless this invention may be carried out in the mode which added modification which becomes various, correction, amelioration, etc. based on this contractor's information and such an embodiment deviates from the meaning of this invention, it is a place needless to say that it is that by which all are contained within the limits of this invention.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] In the consciousness type optometry equipment have [equipment] the observation port equipped with a predetermined lens exchangeable, and it was made to make optometry-ed check an index by looking through this lens from the back of this observation port Consciousness type optometry equipment characterized by establishing a floodlighting means to project light on one on the optical axis of said observation port you are made to be located at cornea top-most vertices examined [said] the eyes, and a light-receiving means to output a light-receiving signal in response to the reflected light by cornea top-most vertices examined [of the light on which it was projected with this floodlighting means / said] the eyes.
[Claim 2] Consciousness type optometry equipment according to claim 1 which a part of floodlighting way in said floodlighting means and/or light-receiving way [at least] in said light-receiving means consist of with the optical fiber.
[Claim 3] Consciousness type optometry equipment according to claim 1 or 2 with which said floodlighting means and said light-receiving means consist of two or more floodlighting means to project light on a mutually different point on the optical axis of said observation port, and two or more light-receiving means to correspond to each [these] floodlighting means, and are established two or more pairs.
[Claim 4] Consciousness type optometry equipment according to claim 3 with which an operation means to detect the collimation distance between cornea top-most vertices examined [said] the eyes and the criteria location of said lens based on the light-receiving signal outputted by said two or more light-receiving means, and to amend the measured value of eye refraction frequency according to this detection value is established.
[Claim 5] Consciousness type optometry equipment given in claim 1 thru/or any of 4 they are. [in which the display which displays the light-receiving condition of said reflected light possible / recognition / from the exterior is prepared based on the light-receiving signal outputted with said light-receiving means]

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the explanatory view showing roughly the configuration of the consciousness type optometry equipment as one example of this invention.
[Drawing 2] It is the explanatory view showing roughly one example of the consciousness type optometry equipment of structure conventionally.
[Description of Notations]
20 Equipment Case
22 Optometry-ed
24 Observation Port
26 Checking Lens
28 Index
30 First Floodlighting Equipment
32 Second Floodlighting Equipment
34 First Light-receiving Equipment
36 Second Light-receiving Equipment
38 38' Light source
40 40' Optical fiber
48 48' Optical fiber
50 50' Photo detector
53 First Display Lamp
54 Second Display Lamp

[Translation done.]

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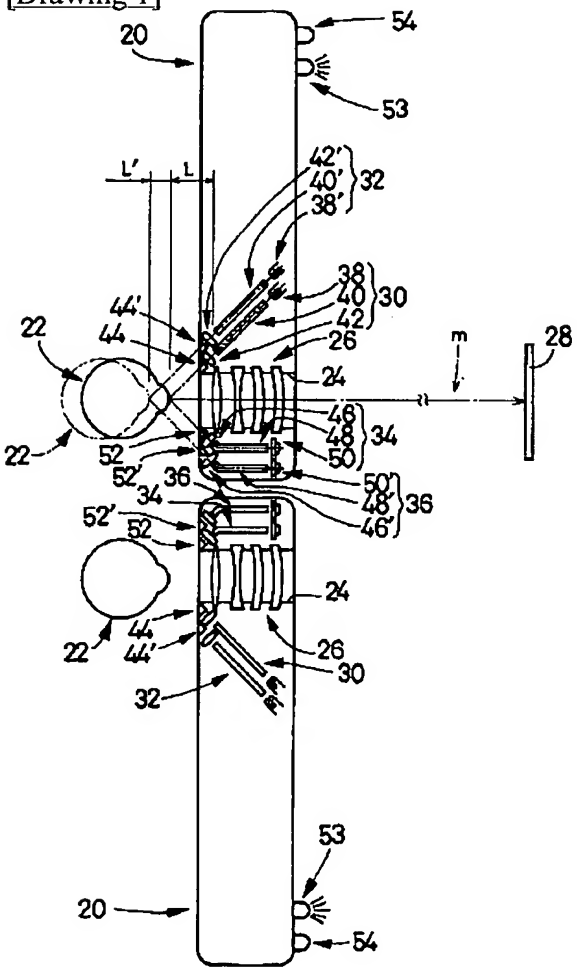
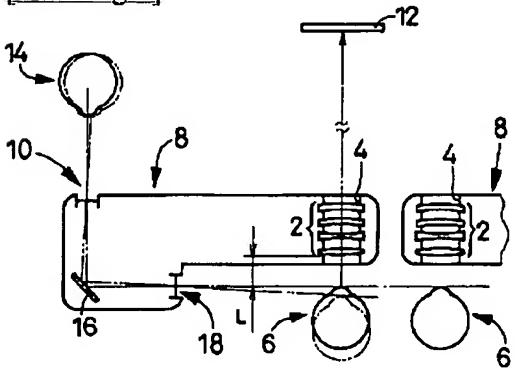
DRAWINGS

[Drawing 1]



[Drawing 2]



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